

# Fabricinae (Feather-duster Polychaetous Annelids) in the Pacific<sup>1</sup>

OLGA HARTMAN<sup>2</sup>

THE UPPER LAYERS of mud in tidal basins such as sloughs and lagoons of various parts of the world are often abundantly populated by minute worms of widely related annelids, for example, *Streblospio benedicti* Webster of the family Spionidae, *Capitella capitata* (Fabricius) of the family Capitellidae, and several species of Sabellidae, subfamily Fabricinae, discussed below. Estuarine worms of this kind may occur in prodigious numbers over considerable areas. Since they are usually very small (a few millimeters long), inconspicuously colored, and covered with slime and debris, they are easily overlooked. Because of their abundance and slime-secreting properties they may be a factor of considerable importance in preventing soil transport.

The Fabricinae are known from the Pacific from comparatively few, mostly isolated, records. The present study concerns some unreported populations from California. In addition, other species of the subfamily from the Pacific are reviewed, and affinities of some others indicated. *Monroika*, a new name, is proposed for *Manayunkia africana* Monro, 1939. There are new combinations in the genera *Fabricia*, *Oridia*, and *Manayunkia*. *Fabricia limnicola* is newly described. The illustrations on the plate were prepared by Mr. Anker Petersen, staff artist of the Allan Hancock Foundation.

The family Sabellidae Malmgren comprises the subfamilies Sabellinae, with 16 to 18 genera and well over 100 species, Fabricinae (below), Myxicolinae, with a single genus and about 7 species, and Lamellisabellinae,

an aberrant, controversial category<sup>3</sup> known for a single species, *Lamellisabella zachsi* Uschakow, from the northwest Pacific.

The last named species is known through a single collection from the southern end of the Okhotsk Sea taken at 3,500 meters in gray-green mud (Uschakow, 1933: 205–208, 2 figs.). A more complete description based on some of the same material is that by Johansson (1937: 23–26, 4 figs.) and the most recent discussion is by Ulrich (1950: 1–25). Uschakow regarded the species as an aberrant sabellid and erected for it the subfamily Lamellisabellinae. Johansson made anatomical studies and concluded that the original account mistook dorsal for ventral sides. The originally named ventral collar thus became the head, or prostomium, with the contained central nervous system. The name Pogonofora was proposed for a new class of organism. Ulrich reviewed the previous accounts, and concluded that the species is even more remote from the annelids than previously supposed; he placed Pogonofora between Tentaculata and Enteropneusta.

The available evidence is not yet convincing. Especially noteworthy is the fact that no one has ever seen the mouth. What was presumed to be the brain in the collar lobe may represent a giant suboesophageal ganglion; the true brain and prostomium may lie well concealed by the tentacular crown. In some slender sabellids, these parts are difficult to see unless the tentacular crown is removed or specimens are fixed after removal from the tube.

The major objections to regarding *Lamel-*

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<sup>2</sup> Allan Hancock Foundation, University of Southern California, Los Angeles, Calif.

<sup>3</sup> A recent communication from Professor J. P. Moore, University of Pennsylvania, Philadelphia, Pa., has expressed a similar view with regard to *Lamellisabella zachsi* Uschakow.

*lisabella* as a polychaete are the supposed absence of setae (which may, however, be represented by the chitinized platelets); the absence of a dorsal groove (which is present if the collar is ventral); and the scarcity of dissepiments (though this scarcity is known for some other annelids). Strong evidence for Uschakow's view is the high palmate membrane of the crown, the body form, the well-developed thoracic collar, the posterior anus, the segmentally arranged parapodial-like structure, and the uncinial-like structures.

The subfamily Fabricinae Rioja, 1917, includes more than 60 species in 12 or more genera. Unlike members of the Sabellinae, which are often very large and conspicuously colored, the Fabricinae are usually minute (only a few millimeters long), but some of the *Chone* group, such as *Megachone aurantiaca* Johnson, are large (more than 80 millimeters long).

The Fabricinae are remarkable for their adaptability to varying intertidal conditions and their adjustment to either brackish or fresh water. The term "sedentary" is not altogether appropriate since many species construct transitory tubes that are rebuilt after removal. Locomotion is forward or backward. The most nearly related species in such genera as *Fabricia* and *Manayunkia* may have interrupted distributions in widely scattered fresh-water regions and intertidal zones (see below).

In their morphological characters the Fabricinae are sometimes separable only microscopically from some smaller members of the Sabellinae. The most reliable and practical character concerns the structure of thoracic neuropodial hooks: in the Fabricinae they are long-handled (Fig. 3); in the Sabellinae they are avicular, lacking a handle. In the first, the nephridial apertures may open only at the anterior end of the thorax, mid-dorsally near the peristomium (hence the name Thoracogoneata Zenkewitsch, 1925); in the second, the nephridial apertures are present in thorax and abdomen (the Abdominogoneata of Zenkewitsch, 1925).

In the Fabricinae, the muscular tissue is nematoid (Johansson, 1927); in the Sabellinae it is not nematoid. In the first there are pulsating pouches (Fig. 1), sometimes called branchial hearts, in the peristomium; in the second such pouches are lacking.

The Fabricinae are recognizable for 12 genera including one (*Monroika*) newly proposed for an aberrant fresh-water species from the Congo River, Africa (see below). There are other described species, such as *Haplobranchus balticus* Karling, 1933, from Finland, and *Fabricia alata* Ehlers, 1897, from Patagonia, that are not clearly referable to known genera. These 12 genera, with their Pacific representatives, are as follows:

1. *Caobangia* Giard, 1893, is known for a single small species, *C. billeti* Giard, 1893, from Tonkin, French Indo-China, in fresh water. See Monro (1939: 232) for review.
2. *Chone* Kröyer, 1856, is known for about 20 species, all marine, with the following 6 from the Pacific:
  - C. cincta* Zachs (1933: 135) from the north Japan Sea.
  - C. ecaudata* (Moore), 1923, from California. See Hartman (1942: 135-136, figs. e-g).
  - C. gracilis* Moore (1906: 257-259, figs. 62-66), from Alaska.
  - C. infundibuliformis* Kröyer, 1856, from Arctic and boreal seas of both hemispheres. See Fauvel (1927: 334-335, fig. 116).
  - C. minuta* Hartman (1944: 280-281, figs. 50-52, 59-60), from California.
  - C. mollis* (Bush), 1904, from California. See Hartman (1944: 279-280, figs. 47-49).

Nine of the remaining species are known from northern and western Europe, two are from the tropical east Atlantic, two are from the Arctic Ocean, one is from northeast America, and one is from South Africa.

3. *Dialychone* Claparède, 1870, is known for a single species, *D. acustica* Claparède, from the Mediterranean Sea. See Fauvel (1927: 333, fig. 115).

4. *Euchone* Malmgren, 1866, is known for about 13 species, all marine, with the following 5 from the Pacific.

*E. alicaudata* Moore and Bush (1904: 165–167), from Sagami Bay, Japan.

*E. analis* (Krøyer), 1856, from Greenland and the northeast Pacific. See Berkeley and Berkeley (1942: 206).

*E. magna* Moore (1923: 245–246), from southern California.

*E. olegi* Zachs (1933: 135), from the north Japan Sea. See Annenkova (1938: 215) for review.

*E. papillosa* (Sars), 1851, from Finmark and north Japan Sea. See Annenkova (1938: 215).

In addition, two species are from New England and eastern Canada, one is from Greenland and the north Atlantic Ocean, one is from the British Isles, two are from Spitzberg and Norway, one is from the tropical east Atlantic, and one is from the Kerguelen Islands.

5. *Fabricia* Blainville, 1828, is known for eight or nine species, in brackish to marine seas, with five or six species from the Pacific.

*F. dubia* Wesenberg-Lund, 1941, from the northeast Pacific (see below).

*F. limnicola*, new species, from California (see below).

*F. pacifica* Berkeley and Berkeley, 1950, from western Canada (see below).

*F. ventrilinguata* Johansson, 1922, from Japan (see below).

*F. sabella* (Ehrenberg), Annenkova (1938: 214) from the north Japan Sea.

?*F. siaukhu* (Annenkova), 1938, from the north Japan Sea (see below).

In addition, the following species are discussed below: *F. atlantica* (Treadwell), *F. capensis* (Monro), *F. dubia* Wesenberg-Lund, *F. leidy* Verrill, and *F. alata*

Ehlers, which is very questionably a member of this genus.

6. *Jasmineira* Langerhans, 1880, is known for 10 species, all marine, of which one is found in the Pacific.

*J. pacifica* Annenkova (1937: 195–196, 3 figs.), from northeast Asia.

In addition, one comes from Spitzberg, three are from western and southern Europe, two are from the Kerguelen Islands, one is from southwest Africa, one is from Ceylon, and one is from the Antarctic.

7. *Manayunkia* Leidy, 1858, is known for possibly nine species, in fresh water to brackish or marine; one is in the Pacific.

*M. pacifica* Annenkova (1934: 329–330, fig. 10), from Bering Island.

In addition, others from various parts of the world are discussed below.

8. *Megachone* Johnson, 1901, is known for a single marine species, from the Pacific.

*M. aurantiaca* Johnson (1901: 430–431, figs. 186–192), from Washington.

9. *Oridia* Rioja, 1917, is known for seven or more species, all marine, of which four are from the Pacific.

*O. armandi* (Claparède), 1864, from southern Europe, is reported from western Mexico. See Rioja (1941: 732, pl. 9, figs. 9–10).

*O. crenicollis* Annenkova (1934: 330–331, fig. 11), from the Bering Sea.

*O. minuta* (Berkeley and Berkeley), new combination (see below).

*O. rivularis* Annenkova (1929: 119–122, figs. 1–7), from the Sea of Okhotsk, eastern Asia.

In addition, another is known from western Europe, one is from Patagonia, and one is from South Africa.

10. *Oriopsis* Caullery and Mesnil, 1896, is known for a single marine species.

*O. metchnikowi* Caullery and Mesnil, 1896, from Europe. See Fauvel (1927: 328–330, fig. 114).

11. *Potamethus* Chamberlin, 1919, is known

for five species, all marine, of which two are from the Pacific.

*P. elongatus* (Treadwell) (1906: 1178, figs. 73-75), from off Molokai Island. See Hartman (1942: 134-135, figs. *b-d*), for emendation.

*P. mucronatus* (Moore) (1923: 243-245, figs. 43-44), from southern California. See Hartman (1942: 134, figs. *a, b-j*) for review.

In addition, single species come from deep water off Florida and Norway, and from the Antarctic Ocean.

12. *Monroika*, a new name, is proposed for a single aberrant fresh-water species, *M. africana* (Monro), 1939, from the Congo River (see below).

#### KEY TO GENERA AND PACIFIC SPECIES OF FABRICINAE

- |   |   |    |
|---|---|----|
| 1. Thoracic neuropodia with long-handled uncini accompanied by pennoned setae (Hartman, 1942, fig. <i>i</i> ) . . . . .   | <i>Potamethus</i> . . . . .                       | 12 |
| 1. Thoracic neuropodia lack pennoned setae . . . . .  |   | 2  |
| 2. Tentacular radioles free, without a weblike or palmate membrane . . . . .  |   | 3  |
| 2. Tentacular radioles united for some distance by a weblike membrane . . . . .   |   | 9  |
| 3. First setigerous segment with palmate and slender setae; alimentary tract recurved so that anus is anteroventral; first 7 setigers lack ventral uncini . . . . . | <i>Caobangia</i>                                  |    |
| 3. Palmate setae absent; anus opens posteriorly . . . . .   |   | 4  |
| 4. Tentacular radioles vary in length; abdomen with 60 or more segments . . . . .   | <i>Dialychone</i>                                 |    |
| 4. Tentacular radioles otherwise; abdomen with few to many segments . . . . .   |   | 5  |
| 5. Abdomen with many segments; thoracic collar well developed and bilobed . . . . .   | <i>Jasmineira pacifica</i>                        |    |
| 5. Abdomen with few segments or a limited number . . . . .  |   | 6  |
| 6. Radioles unbranched . . . . .  | <i>Manayunkia</i> . . . . .                       | 13 |
| 6. Radioles branched in pinnate arrangement . . . . .   |   | 7  |
| 7. With 7 thoracic setigerous segments . . . . .  | <i>Oriopsis</i>                                   |    |
| 7. With 8 (except in <i>Fabricia ventrilin-guata</i> ) thoracic setigerous segments . . . . .   |   | 8  |
| 8. Abdominal uncini with long handle (Fig. 5); abdomen usually with 3 segments (Fig. 2) . . . . .   | <i>Fabricia</i> . . . . .                         | 17 |
| 8. Abdominal uncini avicular or short handled; abdominal segments 3 to 5 or more . . . . .  | <i>Oridia</i> . . . . .                           | 21 |
| 9. Abdomen with a deep ventral groove at posterior end of body . . . . .  | <i>Euchone</i> . . . . .                          | 25 |
| 9. Abdomen without such groove at posterior end of the body . . . . .   |   | 10 |
| 10. Tentacular radioles are simple unbranched filaments . . . . .   | <i>Monroika africana</i>                          |    |
| 10. Tentacular radioles have pinnately arranged filaments . . . . .   |   | 11 |
| 11. Some thoracic notopodial setae broad and spatulate . . . . .  | <i>Chone</i> . . . . .                            | 27 |
| 11. Broad spatulate setae absent . . . . .  | <i>Megachone aurantiaca</i>                       |    |
| 12. Thoracic collar oblique; thoracic spatulate setae with a short mucro . . . . .  | <i>Potamethus mucronatus</i>                      |    |
| 12. Thoracic collar nearly straight; thoracic spatulate setae with a long mucro . . . . .   | <i>Potamethus elongatus</i>                       |    |
| 13. With few tentacular radioles . . . . .  |   | 14 |
| 13. With many, 16 or more, pairs of tentacular radioles . . . . .   |   | 15 |
| 14. With 4 pairs of radioles . . . . .  | <i>Manayunkia estuarina</i> and <i>M. polaris</i> |    |
| 14. With 6 pairs of radioles . . . . .  | <i>Manayunkia caspica</i>                         |    |
| 15. With 16 to 20 pairs of tentacular radioles . . . . .  |   | 16 |
| 15. With 24 to 36 pairs of tentacular radioles . . . . .  | <i>Manayunkia baicalensis</i>                     |    |

16. Without peristomial or pygidial eyes  
.....*Manayunkia speciosa*
16. With peristomial and pygidial eyes..  
.....*Manayunkia pacifica* and *M. spongicola*
17. Thorax with only 4 setigerous segments.....*Fabricia ventrilinguata*
17. Thorax with 8 setigerous segments.. 18
18. Thoracic collar only ventral and limited; thoracic notosetae include slender and spatulate ones..... 18a
- a. Radioles number presumably 2 pairs.....*Fabricia atlantica*
- b. Radioles number 3 pairs.....  
.....*Fabricia dubia*
18. Thoracic collar more extensive and with straight margin; thoracic notosetae slender (Fig. 7) to subspatulate..... 19
18. Thoracic collar with festooned fringes  
.....?*Fabricia siaukhu*
19. Thoracic collar presumably absent..  
.....*Fabricia leidyi*
19. Thoracic collar present..... 20
20. Collar with a pair of digitate lobes at the middorsum.....*Fabricia capensis*
20. Collar without digitate lobes at the middorsum.....*Fabricia limnicola*
21. Thoracic collar with a crenulate margin.....*Oridia crenicollis*
21. Thoracic collar with a straight margin. 22
22. Pygidial eyes (Fig. 2) present..... 23
22. Pygidial eyes absent..... 24
23. Thoracic setae include spatulate and slender ones.....*Oridia minuta*
23. Thoracic setae include only slender ones.....*Oridia armandi*
24. Thoracic setae include spatulate and slender ones.....*Oridia rivularis*
24. Thoracic setae include only slender ones.....*Oridia limbata*
25. Thoracic spatulate setae lack a mucro  
.....*Euchone magna*
25. Thoracic setae with a mucro or slender point..... 26
26. Thoracic collar oblique and longest dorsally.....*Euchone alicaudata*
26. Thoracic collar about equally high all around.....*Euchone analis*
27. Thoracic spatulate setae nearly to without a mucro; body larger, 50 to 100 mm. long..... 28
27. Thoracic spatulate setae with a mucro; body smaller, less than 40 mm. long..... 29
28. Spatulate setae with a short mucro; color in life pale rose or green....  
.....*Chone infundibuliformis*
28. Spatulate setae without a mucro; color in life white or pale yellow.....  
.....*Chone mollis*
29. Abdomen with 17 or 18 segments; spatulate setae with a short mucro; radioles number 7 to 9 pairs.....  
.....*Chone ecaudata*
29. Abdomen with about 26 segments; spatulate setae with a moderately long mucro; radioles number 6 or 7 pairs.....*Chone minuta*
29. Abdomen with about 51 segments; spatulate setae with a very long mucro; radioles number about 10 pairs.....*Chone gracilis*

## Genus FABRICIA Blainville, 1828

This genus was recently re-examined and emended by Berkeley and Berkeley (1950) to include the characters of *Oridia* Rioja (1917). I prefer herein to restrict *Fabricia* to exclude *Oridia*, but to support Berkeley's opinion regarding the lack of importance of thoracic collar development. The diagnosis of the genus is thus the same as that proposed by Berkeley and Berkeley (1950: 66) except that in *Fabricia* the abdominal uncini are long handled and the distal cutting edge has pectinately arranged teeth (Fig. 5), whereas in *Oridia* the abdominal uncini are avicular, lacking a handle.

The generic diagnosis may be summarized. The body consists of the peristomium followed by eight (only four in *F. ventrilinguata* Johansson) thoracic and three abdominal setigerous segments and a pygidium. The

tentacular crown has two or three (Fig. 2) pairs of radioles with filaments in pinnate arrangement; there are no stylodes or radiolar eyes. The palpi are paired and filamentous (Fig. 2). Eyes (Fig. 2) are present in peristomium and pygidium, or one or both pairs are lacking. The thoracic collar is absent, or developed to a varying degree. The first segment lacks setae; the second segment has notosetae only, all of them slender and distally pointed. Segments 3 to 8 (or only 3 to 5) have pointed setae in notopodia; they are slender and narrowly to broadly limbate. Neuropodia have long-handled uncini (Fig. 3). Abdominal segments have pointed setae in neuropodia and long-handled uncini (Fig. 5) in notopodia, with teeth in pectinate arrangement.

The genotype, *F. sabella* (Ehrenberg), has peristomial and pygidial eyes; a thoracic collar is nearly absent; the tentacular crown has three pairs of radioles, and the pinnately arranged filaments are in double rows.

*Fabricia limnicola* new species

Plate 1, Figs. 1-9

COLLECTIONS: Many individuals come from estuarine, intertidal mud flats of Newport Bay and Anaheim Slough, southern California.

The body is threadlike except for the spreading tentacular crown; total length is 5 to 7 mm. or less; width is  $\frac{1}{2}$  mm. or less. Color in life and preserved is pale translucent to white. The body consists of the crown, a simple peristomial ring, eight thoracic and three abdominal setigerous segments, followed by a triangular pygidium.

The tentacular crown consists of paired, symmetrical halves with semicircular bases.

Each half has three long radioles, lacking a weblike membrane. Each radiole has 6 or 7 to 8 or 10 double rows of slender filaments that rise from the inner lateral side of the radioles; successive filaments rise from different levels but all extend distally about equally far. The total number of filaments for a larger specimen may be 72 to 100. The distal free ends of the radioles are long and smooth (Fig. 2). The paired palpi are long, slender, and dusky in color, and extend distally as far as, or somewhat beyond, the radiolar tips. The prostomium is bluntly rounded to conical; it extends forward so as to be slightly visible beyond the thoracic collar (to be seen when the tentacular crown is removed), or it is less long and fully concealed.

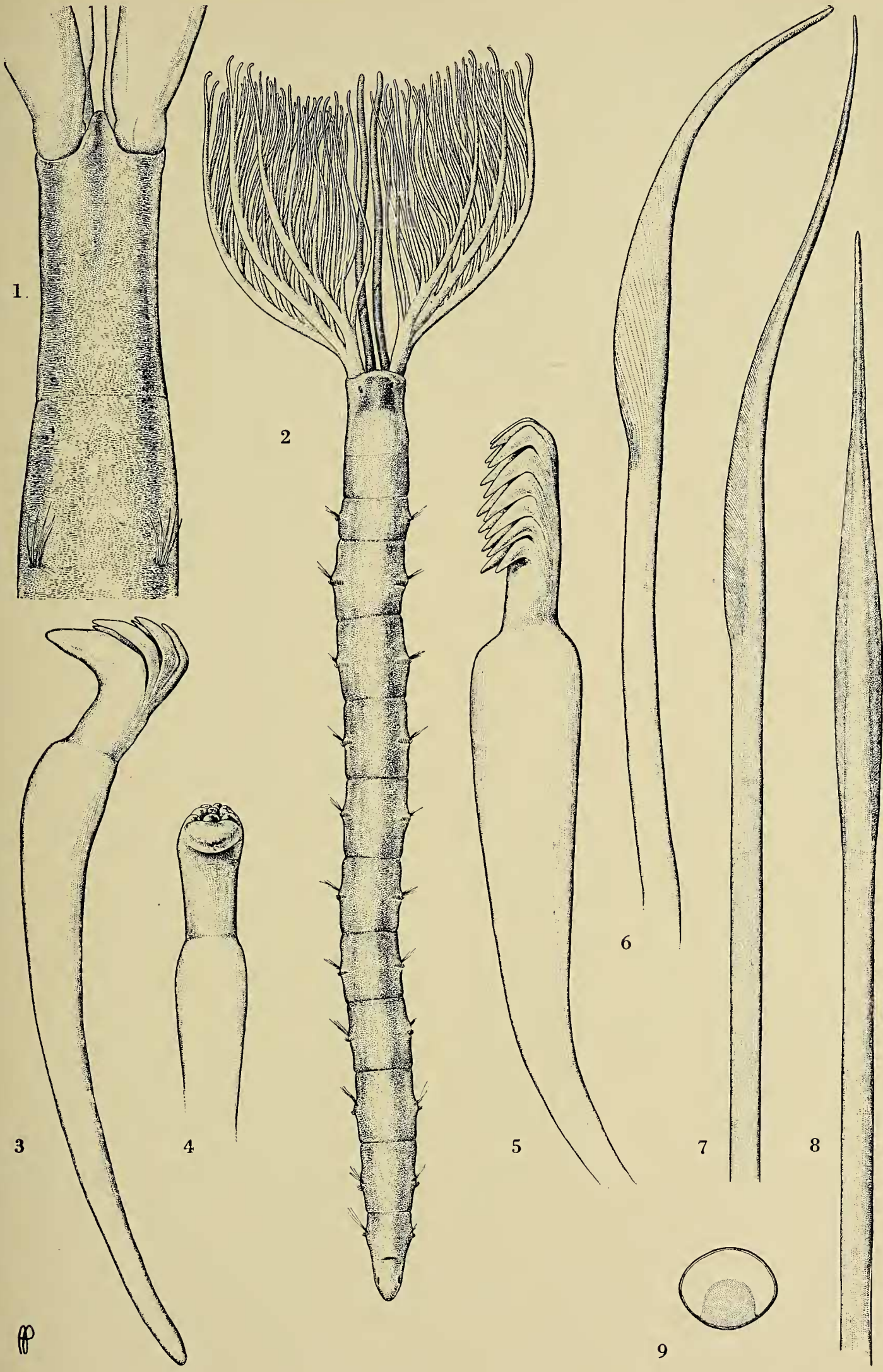
The thoracic collar is a high, straight membrane, continuous all around except for a dorsal fusion with the upper side of the prostomium (Fig. 1); it is closely appressed to the base of the tentacular crown around its lateral and ventral parts and may be overlooked as a separate collar membrane except when the tentacular crown is removed.

The first segment, or peristomium, is longer than those following (Fig. 2); it is longer in specimens fixed in the tube than in those out of it. On its ventral side is a quadrangular, dark area, broadest at its posterior margin; it marks the position of the oral aperture within the collar and is thus between prostomium and peristomium. Dark eyespots are present on the peristomium, visible when the collar is pushed aside.

The second or first setigerous segment is shorter than the peristomium and shorter to longer than those following. It is plain except for the notosetal fascicle which carries from five to eight slender, pointed setae.

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PLATE 1. *Fabricia limnicola*. 1, Anterior end showing base of tentacular crown and first two segments, dorsal view,  $\times 66$ ; 2, entire animal with expanded tentacular crown, ventral view,  $\times 37$ ; 3, thoracic neuropodial hook, side view,  $\times 1580$ ; 4, distal end of thoracic neuropodial hook, front view,  $\times 1580$ ; 5, abdominal notopodial hook, side view,  $\times 1705$ ; 6, short thoracic notopodial seta, side view,  $\times 2350$ ; 7, long thoracic notopodial seta, side view,  $\times 1620$ ; 8, long thoracic notopodial seta, back view,  $\times 1620$ ; 9, cross section of thoracic notoseta from widest region, showing core below and expanded region above,  $\times 3240$ .



Setigerous segments 2 to 8 are biramous. Each notopodium has seven to nine pointed setae and five to eight long-handled uncini arranged in transverse series.

The abdomen consists of three setigerous segments followed by a short, tapering, slightly depressed pygidium, with a pair of dark eyespots located near the posterior end and lateral. The anal aperture is on the ventral side, a short distance in front of the eyes but median. It is followed by a short triangular lobe tapering distally. The proportions and locations of these parts are shown in Figure 2.

Thoracic notosetae are of two kinds. The first three segments have fascicles of eight or nine each; these setae are long, slender, and distally pointed (Figs. 7, 8). Although they appear winged or bilimbate, the distal broad flange is thickened all around the stalk, as can be seen in cross section at the thickest or broadest part of the seta (Fig. 9). Similar setae are present in all other thoracic segments. Beginning at the fourth one and continuing in other thoracic segments, there are only five or six of the longer setae and the lower ones are replaced by three or four shorter, broader ones (Fig. 6). Thoracic uncini are long handled and of a single kind (Fig. 3). They number 7 to 9 or 11 in single transverse series. Each uncinus is slightly beaked and has a large fang and several rows of smaller teeth (Fig. 4).

Abdominal parapodia are biramous. Notopodia are slightly elevated, transversely elongated, and have a single row of handled uncini that number 20 to 30 in a single series; the greatest number in a row is in the first segment and the least in the third segment. The largest uncini in a single series are at the inferior end of the row and there is a gradual diminution in size going upward. These uncini have a double row of seven or eight teeth in pectinate arrangement (Fig. 5). In normal position in parapodia, the tips of the teeth are directed outward and forward. In slide preparations the individual uncini are likely to have handles or teeth imperfect or

broken. This fact, together with their small size (less than 20 micra for the length of the distal part beyond the thickened shoulder), doubtless accounts for imperfect or variable descriptions of abdominal uncini in the different descriptions of species in the genus *Fabricia*.

Some of the specimens examined have many small spherical ova, crowded in thoracic setigerous segments 5 to 9. The only color visible in living or preserved individuals is limited to a few regions. There is a dusky area on the ventral side of the collar and peristomium; a similar pigment is on the dorsal side marking the notch of the collar; the prostomial cone and the palpi are dusky; the eyespots in the peristomium and pygidium are dark, and setae are pale yellow.

The tube is constructed of uniformly small, agglutinated sand granules; it adheres closely to the occupant so that specimens fixed in the tube are difficult to remove. In life, removal can be effected by application of a drop of toxic fluid at the end of the tube.

Holotype and other specimens are deposited in the Allan Hancock Foundation of the University of Southern California, Los Angeles, California.

DISTRIBUTION: Southern California, in estuarine marine mud flats.

#### *Fabricia dubia* Wesenberg-Lund

*Fabricia sabella* Berkeley, 1930, fig. 1g only.

*Fabricia dubia* Wesenberg-Lund (1941: 33-35, figs. 2-4).

COLLECTIONS: Many specimens come from South Bay in Coos Bay, Oregon, washed from intertidal rocks, August, 1950 (coll. Donald Reish).

Individuals measure 2 to 3 mm. long and 0.26 mm. across. There are eight thoracic and three abdominal setigerous segments; the last five thoracic segments are much the longest. The tentacular crown consists of three pairs of radioles, each having many paired filaments in bipectinate arrangement. The paired palpi are triangular and extend



only slightly beyond the ventral collar lobe. Eyes consist of a conspicuous pair of dark spots at the sides of the peristomial region and another similar pair at the sides of the pygidial lobe.

Thoracic notosetae are of two kinds; the upper are longer than the abruptly shorter lower ones; all have a terminal mucro that is longer than that shown by Wesenberg-Lund (1941, fig. 4).

The thoracic collar is obscure except for a large midventral lobe that extends across the ventrum; it is shown by Berkeley (1930, fig. 1g) and Wesenberg-Lund (1941, fig. 2). The body is pale yellow and has a dusky, semi-circular crescent of dark pigment, open in back, across the ventrum of the thorax. The anal aperture is dorsal, located in the pygidial lobe in front of the eyespots. Tubes are cylindrical, have a translucent, chitinized base, and are loosely covered with small sand grains attached on edge or broadside.

*Fabricia dubia* Wesenberg-Lund was first described from the harbor of Copenhagen, Denmark, among barnacle growths. In my opinion, *F. sabella* Berkeley (1930, fig. 1g only), from stones at Newcastle Island, western Canada, is identical. *F. atlantica* (Treadwell) (1932) from New Brunswick, eastern Canada, is very similar except for the radiolar stalks, which are said to number only two pairs; in other respects it appears to be identical.

DISTRIBUTION: Eastern Denmark; Oregon and western Canada.

Other species of *Fabricia* from the Pacific are as follows:

1. *F. pacifica* Berkeley and Berkeley (1950: 66-67), from western Canada, taken at low tide, was earlier described as *F. sabella* Berkeley (1930: 73, 3 figs.). The thoracic collar is high and well defined; it is deeply incised on the dorsal side; peristomial and pygidial eyespots are present; abdominal uncini are long handled and have six or seven teeth, presumably in a single pectinate row.

2. *F. ventrilinguata* Johansson (1922: 9,

pl. 4, figs. 1-3) is a marine species from Japan. It has only four, instead of eight, thoracic setigerous segments; the abdominal count is not known. Presumably, eyes are absent. There are three pairs of radioles that lack a weblike membrane. Abdominal uncini are handled and have teeth in pectinate series. The generic status may be doubtful because of its low segmental count.

3. *F. sabella* (Ehrenberg), 1836, originally from western Europe, is recorded by Annenkova (1938: 214) from the north Japan Sea, among corallines, without description.

4. ?*F. siaukhu* (Annenkova), new combination, was originally described as *Manayunkia siaukhu* Annenkova (1938: 214, 230) from north Japan, among algae. This has tentacular radioles with pinnately arranged filaments and is thus not a species of *Manayunkia* Leidy. A thoracic collar is present; it has festooned margins and is deeply notched dorsally. The tentacular crown has three pairs of radioles; each radiole has a long slender tip and the many fine filaments end at about the same level. There are eight thoracic and three abdominal setigerous segments; the peristomium is a smooth ring. Eyes include two in the peristomium and one in the pygidium. These characters agree with those of *Fabricia*. The generic status is questionable because abdominal uncini remain unknown.

In addition, the following species belong to the genus *Fabricia* Blainville:

1. *F. capensis* (Monro), new combination, was originally described as *Oridia capensis* Monro (1937: 366-370, figs. 1-8), from South Africa. There are eight thoracic and three abdominal setigerous segments. The body is about 10 mm. long and 0.3 mm. wide, and the tubes measure 50 to 60 mm. long. The tentacular crown has three pairs of radioles, each with seven or eight filaments in (presumably) a single row. The peristomial collar is entire except for a pair of digitate lobes at the middorsum. Eyes include one pair in the peristomial ring and one pair in the pygidium. Thoracic notosetae are slender,

the neurosetae are long-handled uncini. Abdominal uncini are handled, with teeth in a pectinate row.

2. *F. atlantica* (Treadwell), new combination, was originally described as *Haplobranchus atlanticus* Treadwell (1932: 279–280, figs. 1–8) from St. Andrews, New Brunswick, in intertidal mud tubes. There are eight thoracic and three abdominal setigerous segments. The body measures about 4 mm. long. The thoracic collar is prominent on the ventral side and oblique at the sides; the dorsal end is short. The tentacular crown is incompletely known, except that it has pinnately divided radioles, each with a double row of seven or eight filaments. There are paired eyes in the peristomium and in the pygidium. Thoracic uncini are long handled; abdominal uncini are moderately long handled and have teeth in pectinate series. The second to eighth segments have slender and subspatulate setae in notopodia.

3. *F. leidy* Verrill (1873:619), from New England, was not described until later by Leidy (1883: 210–211, figs. 14–20), based on specimens from Massachusetts and Rhode Island, found on rocks between tide marks and under patches of *Fucus*. The tubes project from the sand and mud and are firmly fixed together. Individual specimens measure 3 to 4 mm. long; color in life is yellowish brown. The thorax consists of eight and the abdomen of three setigerous segments. There are paired eyespots in the thorax and in the pygidium. The tentacular crown consists of three pairs of pinnately branched radioles with the filaments in a double row. The thorax has slender and spatulate notosetae and long-handled uncini. The abdomen has long-handled uncini above and slender setae below. A collar is not known to be present. In this respect, the species compares with the genotype, *F. sabella* (Ehrenberg). Except for the presence of spatulate thoracic setae, reportedly absent in *F. sabella*, the two are not clearly separable. Wesenberg-Lund (1941: 36) suspects the presence of spatulate setae even in the geno-

type and thinks they may have been overlooked.

4. ?*F. alata* Ehlers (1897:135–137, figs. 206–210), from Patagonia and South Georgia in littoral zones, is questionably a species in this genus. An emended account, based on Antarctic collections, is in preparation.

#### Genus MANAYUNKIA Leidy, 1858

Leidy (1883: 204–211, pl. 9, figs. 1–24) gives an emended account.

The type species is *M. speciosa* Leidy, 1858.

*Manayunkia* includes *Haplobranchus* Bourne, 1883, *Dybowscella* Nusbaum, 1901, *Garjaiewella* Dybowski, 1929, *Fabriciella* Zenkewitsch, 1935, and *Fabriciola* Friedrich, 1940.

The tentacular crown has bases that are semicircular; radioles are simple, unbranched filaments that range in number from 16 to 36 down to only 4 pairs; they rise from a common base and are not pinnately arranged, thus differing sharply from *Fabricia* (above). There is no weblike or palmate membrane at the base of the crown. The peristomium lacks or has a collar that is entire or has a dorsal notch. Eyes are absent, or present as a pair in the peristomium or also pygidium. The body includes eight thoracic and three abdominal setigerous segments. The peristomium lacks setae. The setal formula agrees with that of *Fabricia* (see above).

*Fabriciella* Zenkewitsch (1935: 199) was proposed to include two species, *Manayunkia pacifica* Annenkova and *Fabricia* (*Manayunkia*) *spongicola* Southern, both of which are here retained in *Manayunkia* Leidy. *Fabriciella* was distinguished from *Manayunkia* Leidy mainly for having pygidial eyespots and for specific differences in the tentacular crown, both of which characteristics are given only specific distinction in the present account. For the same reason, *Fabriciola* Friedrich (1940: 362) is here regarded congeneric.

Only one species is known from the Pacific.

1. *Manayunkia pacifica* Annenkova (1934: 329–330, fig. 10) comes from the

Bering Sea in littoral zones. The body is minute, only 1.5 to 3 mm. long, and is cylindrical in shape. There are eight thoracic and three abdominal setigerous segments. The tentacular radioles number 15 to 18 on a side, are slender, unbranched, and arranged in a tuft. There is no palmate membrane, and all radioles are about equally long. The palpi are long. The thoracic collar is a simple undivided flange incised only on the dorsal side. There are paired eyes in the peristomium and in the pygidium. The setae and uncini are those characteristic of the genus. The tube is of silt and fine sand.

In addition, the following species appear to be congeneric:

1. *M. aestuarina* (Bourne), 1893, from western Europe in fresh water. (See Fauvel 1927: 326–327, fig. 113.)

2. *M. baicalensis* (Nusbaum), 1901, from Lake Baikal, in fresh water. (See Zenkewitsch, 1925: 34–35, figs. A to X.)

3. *M. caspica* Annenkova (1928: 19–20, pl. 3, figs. 1–4), from the Caspian Sea in 44–64 meters.

4. *M. polaris* Zenkewitsch (1935: 195–203, figs. 1–6), from northwest Russia at midtide level. This appears to be near *M. aestuarina* (Bourne).

5. *M. speciosa* Leidy, 1858 (see Leidy, 1883: 204–211, pl. 9, figs. 1–24), from northeast United States in fresh and brackish water, and recorded also from the western end of Lake Superior by Meehearn (1929: 479–480). *M. eriensis* Kreckler (1939: 153) from Lake Erie, Ohio, in fresh water, may be the same.

6. *M. spongicola* was originally named *Fabricia (Manayunkia) spongicola* Southern (1921: 653–655, pl. 31, fig. 29) from Lake Chilka, India, in fresh water.

7. *M. baltica* (Friedrich) (1940: 363–364, figs. 1–2) from the Baltic Sea.

8. *M. bochmanni* (Friedrich) (1940: 364–365, figs. 3–4) from the Baltic Sea.

Other species that were originally described as *Manayunkia*, or under one of its synonyms, are the following:

1. *Haplobranchus balticus* Karling (1933: 242–245, figs. a–e), from the Baltic Sea, has unbranched radiolar filaments as in *Manayunkia* Leidy. However, there are 11 thoracic and 3 abdominal setigerous segments. The first segment has both setae and uncini. These characters do not agree with any named genus.

2. *Manayunkia africana* Monro, 1939, is here referred to *Monroika* (see below).

3. *Manayunkia siaukhu* Annenkova, 1938, is questionably referred to *Fabricia* (see above).

4. *Haplobranchus atlanticus* Treadwell, 1932, is referred to *Fabricia* (see above).

#### Genus *Monroika* new name

The small body, a few millimeters long, consists of a simple peristomium, eight thoracic and two abdominal setigerous segments. The tentacular crown has simple, undivided radioles in a tuft, as in *Manayunkia*, but there is a high weblike palmate membrane that unites the bases of the radioles. The thoracic collar is distinct and entire with a middorsal incision. Eyespots are lacking from the peristomium and pygidium. The first segment lacks setae. The first setigerous segment has notosetae only. The second to fifth have slender and spatulate notosetae and long-handled uncini. Segments 6 to 8 are similar but lack spatulate notosetae. Abdominal segments have handled uncini with teeth in pectinate rows; neurosetae are slender. *Monroika* differs from *Manayunkia* especially in having a weblike membrane in the crown. A single species is known.

*Monroika africana* (Monro) is the type species.

*Monroika africana* (Monro) new combination  
*Manayunkia africana* Monro (1939: 220–223, figs. 1–5).

Length of the body is about 2 mm. The weblike tentacular membrane extends distally for about a third of the radiolar length. Radioles number about 12. The species is known only from the Congo River, about

150 km. from the sea and beyond tidal effects; it occupies sandy tubes on mollusk shells and in incrustations on stones.

Genus *ORIDIA* Rioja, 1917

This genus differs from *Fabricia* Blainville essentially in having abdominal uncini that lack a handle. There are 8 thoracic and 3 to 12 abdominal setigerous segments. Tentacular radioles number two to five pairs and have filaments in pinnate arrangement. A thoracic collar is present or absent. Peristomial and pygidial eyespots are present. Thoracic uncini resemble those of *Fabricia*. Four species are recorded from the Pacific (see above). One is here newly referred to *Oridia*.

*Oridia armandi* (Claparède), 1864, is the type species.

*Oridia minuta* (Berkeley and Berkeley)  
new combination

*Fabricia minuta* Berkeley and Berkeley (1932: 315–316, figs. A–E).

Total length is about 11 mm. and width is about 0.1 mm. The body consists of eight thoracic and three to five abdominal setigerous segments. The tentacular crown consists of two pairs of radioles with pinnately arranged filaments. A thoracic collar is lacking. Peristomial and pygidial eyespots are present. Thoracic notosetae are slender and subspatulate. Thoracic uncini are sharply curved; abdominal uncini lack a stem.

This species is known only from the west coast of Vancouver Island, Canada, from among algae.

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